

## **REMARKS**

In view of the above amendments and following remarks, reconsideration of the rejections contained in the Office Action of March 28, 2005 is respectfully requested.

In the Office Action, the Examiner rejected claims 1-45 and 62-72 over various combinations of Dordi et al., U.S. Patent 6,267,853 (Dordi 1), Meyer et al., U.S. Patent 6,309,981 (Meyer), Begin et al., U.S. Patent 5,310,410 (Begin), Olbrich et al., U.S. Patent 5,083,364 (Olbrich), Satoh et al., U.S. Patent 6,084,419 (Satoh) and Dordi et al., U.S. Patent Publication No. 2002/0157960 (Dordi 2). However, it is respectfully submitted that the present invention, particularly as now amended above, clearly patentably distinguishes over each of these references.

By the above, each of independent claims 1, 19, 36-39, 41-42, 44-45 and 62 has been amended to recite a film thickness measuring section as well as a recording means for recording results of measurement of the film thickness. More specifically, each of these claims recites that the film thickness measuring section is for measuring a film thickness of the plated metal film that is formed on the semiconductor substrate to adjust a plating time or a polishing time. The recording means is provided for recording results of measurement of the film thickness measured with the film thickness measuring section to use the recorded data for controlling a processing time of the subsequent step and is dated for judging the state of each processing step.

Dordi 1 discloses an electro-chemical deposition system with flexible architecture. However, Dordi 1 is completely silent with respect to any film thickness measuring section or recording means as claimed above.

Accordingly, Dordi 1 clearly fails to disclose or suggest claims 1-26, 36-45 and 62.

In rejecting claims 1, 36, 44 and 62, the Examiner further referred to Meyer. Meyer discloses etch bevel removal of copper from silicon wafers. Meyer, however, is also silent with respect to any film thickness measuring section or recording means.

In rejecting claims 19 and 45, the Examiner further cited Olbrich. Olbrich is directed to a system for manufacturing semiconductor substrates. However, Olbrich also bears no relation to the claimed film thickness measuring section and recording means.

Begin was cited with respect to claim 5. Begin is directed to an inspection unit for inspecting a wafer after it has been processed. While Begin discloses inspection chambers for a semiconductor wafer, including an inspecting apparatus schematically shown at 67, there is no reference to a film thickness measuring section for measuring a film thickness of the plated metal film formed on the semiconductor substrate and adjusting a plating time or a polishing time. Nor is there any reference to a recording means as claimed. As such, Begin also does not suggest the present invention as now claimed in claims 1, 19, 36-39, 41-42, 44-45 and 62.

Satoh is directed to a method and apparatus for inspecting semiconductor integrated circuits. However, it does not relate to film thickness measurement or a recording means as claimed. Rather, it is developed toward testing the electric characteristics of each of the IC chips produced.

Dordi 2 is directed to an electro-chemical deposition cell. But Dordi 2 also provides no disclosure or suggestion whatsoever with respect to either a film thickness measuring section or a recording means.

By the above, claim 27 has been amended to define the bevel etching unit as one that supplies an acid solution to a center portion of the semiconductor substrate being rotated and an oxidizing agent solution to a peripheral edge portion of the semiconductor substrate. It has further been defined as rotating the semiconductor substrate so as to spin dry the semiconductor substrate that has been etched. Claim 27 further defines the transport mechanism as having a dry hand for handling the semiconductor substrate in a dry state and a wet hand for handling the semiconductor substrate in a wet state.

Claim 27 was rejected over Dordi 1 by itself. However, according to claim 27, the semiconductor substrate is spin-dried after being etched, and it is then removed from the bevel etching unit by the dry hand. Thus, the semiconductor substrate can be kept dry in subsequent steps. Because the transport mechanism can separately use the dry hand for handling the dry semiconductor substrate, and the wet hand for handling the wet

semiconductor substrate, a dry-in/dry-out apparatus can be realized. Dordi 1 fails to disclose or suggest any such transport mechanism.

Claim 63 has been amended to recite that the bevel etching unit is one which supplies the acid solution to the center position of the semiconductor substrate being rotated and supplies an oxidizing agent solution to a peripheral edge of the semiconductor substrate for etching and removing at least one of the plated metal film, the seed layer and the barrier layer formed at the peripheral edge portion of the semiconductor substrate, with the bevel etching unit rotating. Further, the bevel etching time is recited as changing based upon the thickness of the plated metal film.

Dordi 1 and Begin do not teach or suggest any changes in bevel etching time based upon the thickness of the plated metal film. Accordingly, they do not disclose or suggest claim 63.

Claims 64 and 65 have been amended to recite that the cleaning unit has rolls for scrub-cleaning the semiconductor substrate. Dordi 1 and Begin do not disclose or suggest a cleaning unit having rolls for scrub-cleaning a semiconductor substrate. Accordingly, these claims are also not disclosed or suggested by the prior art cited by the Examiner.

Claim 66 has been amended to recite that the seed layer forming unit forms the seed layer and the semiconductor substrate by electroless plating. Electroless plating is a wet process, it is noted. It can be followed by electroplating to form a successive of metal film, which is also a wet process. The two wet processes contribute to improve throughput, it is noted.

Dordi 1 teaches deposition of the seed layer by PVD, which is a dry process. Thus, Dordi 1 fails to disclose or suggest deposition of the seed layer by electroless plating. Thus, claim 66 is also clearly not disclosed or suggested by Dordi 1.

Claim 67 has been amended to recite that the barrier layer forming unit forms the barrier layer and the semiconductor substrate by electroless plating. As with claim 66,

this can contribute to an improved throughput. Dordi 1 and Meyer both fail to disclose or suggest a barrier layer forming unit using an electroless plating process.

Claim 68 has been amended to recite that a cover plating unit forms a plated cover layer on the semiconductor substrate by electroless plating. Similarly to claims 66 and 67, Dordi 1 does not disclose or suggest a cover plating unit which forms a plated cover layer on a semiconductor substrate by electroless plating.

Each of claims 69, 70 and 72 has been amended to recite a substrate holding portion adapted to be raised and lowered between a lower position, an upper position and a middle position as part of the plating module. This allows for three operations to take place, i.e. load/unloading, plating and cleaning, and to be performed in a single unit. Dordi 1 does not disclose or suggest a holding portion that is movable between three vertical positions as claimed. Thus, each of claims 69, 70 and 72 clearly patentably distinguishes over Dordi 1.

Claim 71 has been amended to specify that the plurality of film thickness measuring units are attached to the robot hand, an upper portion of an exit or entrance portion of the plating module or a mounting base provided inside the plating module or reversing machine. This reflects an aspect of the present invention in that the semiconductor substrate can have the film thickness measured before treatment and after treatment without a separate additional operation wasting process time. Dordi 1 does not disclose or suggest film thickness measuring units. Begin does not mention any film thickness measuring units, nor does Begin disclose or suggest the locations recited in claim 71. As such, claim 71 clearly distinguishes over both Dordi 1 and Begin.

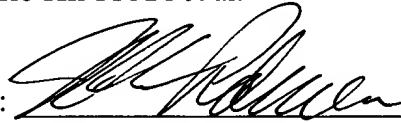
New claims 73-94 have now been added. All of these claims are dependent claims depending from the above-referenced independent claims. All of these claims also correspond to the elected species.

Accordingly, it may be seen that all of the claims now pending in the present application clearly patentably distinguish over the references cited by the Examiner. Indication of such is respectfully requested.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicants' undersigned representative.

Respectfully submitted,

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